

# ABSTRACT

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**THESIS:** Prophylactic ankle stabilizers and their effect on lower extremity landing mechanics during drop jump landings to fatigue

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The impact forces at landing are predominately absorbed by the hip, knee and ankle joints. Fatigue has been shown to increase the amount of work performed by the ankle and to reduce the work performed by the knee during landings. The purpose of this study was to assess the kinematic lower extremity motion and kinetic patterns during landings to fatigue, with and without ankle brace usage. Nine recreationally active males ( $n = 7$ ) and females ( $n = 2$ ) performed repetitive drop jumps to fatigue for an un-braced and braced condition. Kinematic and kinetic variables were assessed during the first 100 ms after ground impact. Due to the high skill level of the participants, none of the individuals reached a fatigued state. No significant main effect of fatigue was demonstrated on ankle work ( $p = 0.260$ ). There was no significant main effect due to fatigue on the hip ( $p = 1.000$ ), knee ( $p = 1.000$ ) or ankle ( $p = 0.636$ ) relative work contributions. Fatigue caused a shift toward a more erect landing position at initial ground contact (IGC). No significant main effect of the brace on hip ( $p = 0.437$ ), knee ( $p = 0.283$ ) or ankle ( $p = 0.314$ ) angles was observed at IGC angles. The use of Ankle Stabilizing Orthosis® (ASO) ankle braces caused a shift toward greater knee contribution in a fatigued state. Plantar

flexion angles were decreased the most during the braced un-fatigued condition. There was an inverse relationship between knee and hip angles as compared to ankle angles at IGC. When the hip and knee joint displayed less flexion at IGC, the ankle balanced the positions out by landing in more plantar flexion.